

REMARKS

Claims 1-6, 8-11 and 13 are rejected, and claims 12, 14 and 15 are withdrawn from consideration as being directed to a non-elected invention. Review and reconsideration on the merits are requested.

Claims 1-6, 8-11 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 2003/065465 to Udagawa, with reference to U.S. Patent No. 7,465,499 as an English language equivalent. In addition to disclosing the basic structure of the claimed device, the Examiner considered that the diffusion of phosphorous atoms into the light-emitting layer 104 would result in the claimed profile.

In the Response filed April 1, 2011, Applicant noted that (i) diffusion of phosphorous atoms into the light-emitting layer 104 of U.S. Patent No. 7,465,499 to Udagawa does not result in the claimed profile; (ii) phosphorous atom concentration in the light-emitting layer is not subject to routine optimization; and (iii) one of ordinary skill would optimize the composition of those layers which are in contact with the light-emitting layer to avoid lattice mismatch, but would not modify let alone optimize the composition of the light-emitting layer.

In reference to the Advisory Action and as to (i) above, the Examiner's basic contention was that the language of claim 1 (wherein the light-emitting layer has a profile of phosphorous atom concentration that gradually decreases from a bottom thereof in a thickness direction) does not distinguish over and still encompasses U.S. Patent No. 7,465,499 where the phosphorous atom concentration becomes highest at the junction interface between light-emitting layer 104 and p-type BP layer 103 and at the junction interface between the light-emitting layer 104 and the n-type BP layer 105, but becomes lowest at the middle portion of the light-emitting layer 104. Namely, in U.S. Patent No. 7,465,499, the phosphorous atom concentration is highest at the

junction interface between layers 104 and 103 and decreases towards the middle portion of the light-emitting layer 104.

In response, claim 1 has been amended to recite that “wherein the light-emitting layer has a profile of phosphorous atom concentration that gradually decreases from a bottom to a top thereof, in a thickness direction.” Support is found at page 12, lines 20-28 of the specification.

The subject amendment to claim 1 clearly distinguishes over the profile disclosed in U.S. Patent No. 7,465,499.

As to (ii) and (iii), the Examiner cited paragraphs [0021]-[0022] of U.S. Publication No. US 2001/0054717 as being an explicit recognition by the prior art that phosphorous atom concentration in the light-emitting layer may be varied to reduce lattice mismatch with a BP-based buffer layer so as to contribute to high-luminous intensity emission of the light-emitting device. For the same reasons, the Examiner further concluded that phosphorous atom concentration in the light-emitting layer is subject to routine optimization contrary to the argument made in the Response filed April 1, 2011.

Applicant respectfully disagrees.

The passage at paragraphs [0021] and [0022] of U.S. Publication No. US 2001/054717 relates to a DH structure (see paragraph [0017]) having a structure as set out in paragraph [0056] where the phosphorous concentration of the lower clad layer 3 which is the gallium nitride phosphide single crystal layer is controlled so as to reduce lattice mismatch with underlying BP-based buffer layer 2 (see Fig. 3). Although the lower clad layer 3 is part of the double hetero-junction structure, it is not the light-emitting layer. Therefore, as noted by Applicant, one of ordinary skill would modify the compositions of the layers in contact with the light-emitting layer, but not the composition of the light-emitting layer itself.

More particularly, adjustment of phosphorous atomic concentration in the light-emitting layer is not conventionally used to avoid the generation of lattice mismatch. In an ordinary way, lattices mismatch is not suppressed by adjusting the composition of the light-emitting layer, but rather by adjusting the composition of a layer having a border with (i.e., adjacent to) the light-emitting layer. The wavelength of the light from the light-emitting layer is attributed to the composition of the light-emitting layer. Therefore, adjusting the composition of the light-emitting layer is used to fix the wavelength of the light emitted.

In U.S. 2001/0054717 relating to a double hetero-junction structure, no adjustment of phosphorous atomic concentration is performed in the light-emitting layer. However, in the lower clad layers one can find many examples of such an adjustment.

In view of the amendment to claim 1 and the foregoing remarks, it is respectfully submitted that the amended claims are patentable over WO 2003/065465, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1-6, 8-11 and 13 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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Date: May 26, 2011